

In the Claims

78. (four times amended) A test apparatus for testing a semiconductor die having a pad comprising:

a plate;

[for retaining the die;]

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a substrate [mounted to] on the plate [for making] configured to make an electrical connection[s] with the die;

a clamping mechanism [mounted] attached to the plate configured to bias the die against the substrate with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained by the mechanism on the plate in electrical contact with the substrate; and

a contact on the substrate configured to electrically contact the pad on the die, the contact comprising a surface and a plurality of spaced raised portions projecting from the surface, the raised portions dimensioned to penetrate into [a] the pad [on the die] at the force to a penetration depth equal to a height of the raised portions but less than a thickness of the pad, the surface dimensioned to limit further penetration of the raised portions into the pad at the force.

[; and]

[a conductive trace [formed] on the substrate in electrical communication with the contact.]

79. (four times amended) The apparatus of claim 78 wherein the surface is dimensioned to penetrate into the pad[s] at a second force which is about two to ten times the force.

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80. (four times amended) The apparatus of claim 78 [wherein the] further comprising a conductive trace on the substrate in electrical communication with the contact, and an external contact on the plate in electrical communication with the trace.

[comprises a second contact configured to electrically engage a second pad on the plate.]

81. (four times amended) The apparatus of claim 78 wherein the raised portions have a height with respect to the surface of about 5000Å.

82. (four times amended) The apparatus of claim 78 wherein the pad comprises a bondpad.

[recessed within a passivation layer formed on the die.]

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87. (thrice amended) A test apparatus for testing a semiconductor die having a plurality of pads comprising:

a plate [for retaining the die, the plate] comprising a plurality of external leads;

a substrate [mounted] on the plate [for making] configured to make electrical connections with the die;

a clamping mechanism [mounted] attached to the plate [and] configured to bias the die against the substrate with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the mechanism attached to the plate, and the die retained by the mechanism on the plate in electrical contact with the substrate;

a plurality of contacts on the substrate configured to electrically contact the pads, the contacts [having] comprising surfaces and a plurality of spaced raised portions projecting from the surfaces [dimensioned] with a height, the

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raised portions configured to penetrate into the pads [on the die] with a penetration depth[s] equal to the height [s of the raised portions] but less than a thickness[es] of the pads while the surfaces [of the contacts] limit further penetration, [of the raised portions into the pads,] the force selected to be greater than a first force at which the raised portions penetrate the pads but less than a second force at which the surfaces penetrate the pads, the second force being from two to ten times the first force; and

a plurality of conductive traces on the substrate in electrical communication with the contacts and with the external leads.

88. (thrice amended) The apparatus of claim 87 wherein the height[s] of the raised portions [are] is at least 5000Å.

90. (thrice amended) The apparatus of claim 87 wherein the second force is [from] about two [to ten] times the first force.

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91. (thrice amended) The apparatus of claim 87 further comprising a plurality of bond pads on the conductive trace.

92. (thrice amended) A test apparatus for testing a semiconductor die having a plurality of pads comprising:

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a plate [for retaining the die, the plate] comprising a plurality of external leads;

a substrate [mounted to] on the plate [for making] configured to make electrical connections with the die;

a clamping mechanism [mounted] attached to the plate [and] configured to bias the die and the substrate together with a force;

the plate, the substrate and the mechanism configured such that the die can be placed on the substrate, the

mechanism attached to the plate, and the die retained by the mechanism on the plate in electrical contact with the substrate;

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a plurality of contacts on the substrate configured to electrically contact the pads, [aligned with pads on the die,] the contacts including a plurality of spaced raised portions projecting from surfaces of the contacts, the raised portions dimensioned to penetrate into the pads at the force by a penetration depth equal to a height of the raised portions but less than a thickness of the pads while the surfaces of the contacts limit further penetration [of the contacts] into the pads, the force selected to be greater than a first force at which the raised portions penetrate the pads but less than a second force at which the surfaces penetrate the pads, the second force selected to be from two to ten times the first force; and

a plurality of conductive traces [formed] on the substrate in electrical communication with the contacts and with the external leads.

93. (thrice amended) The apparatus of claim 92 wherein the [surfaces] contacts and the pads are substantially aligned.

[in a Z axis direction.]

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96. (thrice amended) The apparatus of claim 92 wherein [the] each raised portion[s] comprises a point[s].